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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/539,743	02/13/2006	Hoo-Geun Lee	29347/50809	5025

4743 7590 07/22/2009

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EXAMINER	
SHEVIN, MARK L	
ART UNIT	PAPER NUMBER
1793	

MAIL DATE	DELIVERY MODE
07/22/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/539,743	LEE ET AL.	
	Examiner	Art Unit	
	MARK L. SHEVIN	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 June 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4 and 6-30* is/are pending in the application.

4a) Of the above claim(s) *19-30* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4 and 6-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *07/08/2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

1. Claims 1-4, 6-30, filed June 29th, 2009 are pending.

Acknowledgement of RCE

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 5th, 2009 has been entered.

Information Disclosure Statement

3. The information disclosure statement (IDS) submitted July 8th, 2009 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement has been considered by the examiner. Please refer to applicants' copy of the 1449 form submitted herewith.

Claim Rejections - 35 USC § 103

4. **Claims 1-4, 6-7, and 9-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Joo** (US 6,277,324) in view of **Hofmann** (US 3,897,183 A1) and **Fayed** (Rolling Pressing, in *Handbook of Powder Science and Technology*, 2nd Ed., edited by M.E. Fayed and L. Otten, 1997, ch. 6, p. 345-363.)

Joo

Joo, drawn to an apparatus and method for manufacturing molten pig iron, teaches producing reducing material of mixed hot fine direct iron and calcined additives from multiple fluidized beds (col. 2, lines 17-34).

A briquetting device, **16**, receives calcined additives such as lime and reduced iron, to roll press (col. 5, lines 1-8, col. 7, lines 38-43) these components to form into compacted material.

The reduced iron and calcined additive are charged into a melter-gasifier **31** to be manufactured into a molten iron (col. 10, lines 27-38) by injecting oxygen (Figs. 3-5 and col. 12, lines 13-25) into a coal packed bed (col. 10, lines 39-42).

Joo does not teach forming grooves on the pressed surfaces, crushing the compacted material, charging the crushed compacted material to coal-packed bed, or the geometry of the roll pressed compacts.

Hofmann

Hofmann, drawn to a method of roll pressing or briquetting, teaches producing briquettes from direct reduced iron in sheets of D-shaped pillows / lumps through the use of roll pressing. The lumps are interconnected by lands because the high pressures required by rolling make it necessary to have some clearance between the rolls (col. 1, lines 5-20). The rolled sheet product of direct reduced iron fines (col. 2, lines 29-31) is shown in figures 3 and 4. Grooves are formed on the pressed surfaces are shown in Fig. 4. The shape of the briquette shape is designed easily break and separate the briquettes from one another during crushing as shown in Fig. 1.

Any compacts that are not first crushed are recycled to be crushed again to reduce them to the proper size (col. 5, lines 1-10).

Fayed

Fayed, drawn to the principles and processes of double roll pressing, teaches after forming briquettes or compacts in the form of a sheet, these sheets are crushed and screen to yield a granular product (p. 345, col. 2, paras 1-2).

The pocket / mold shape is crucial in roll pressing in terms of gas release, release of the formed compacts, and the density of the final product (p. 361, col. 1, paras 1-3).

Fayed also teaches that the roll gap and thus the thickness of the roll pressed sheet produced, is a result effective variable (p. 352, col. 1, para 6 - p. 353, col. 1, para 1).

Shallow pockets improve deaeration (p. 356, col. 1, para 2).

Regarding claims 1, 9 and 10 it would have been obvious to one of ordinary skill in metallurgy, at the time the invention was made, taking the disclosures of Joo, Hofmann, and Fayed as a whole, to incorporate the briquette shape of Hofmann and the crushing step as taught by both Hofmann and Fayed for the following reasons. The briquette shape of Hofmann allows the easy separation of briquettes by crushing the sheet to as taught by Hofmann. Fayed adds that the pocket shape, and thus shape of the briquette is critical in the process of roll pressing and that shallow pockets improve deaeration. The briquette sheet is then crushed as taught by both Hofmann and Fayed to obtain material of a chosen size.

With respect to the briquette shape of claims 1, 9, and 10 and the last amendments to claims 1 and 9, Fig. 4 of Hofmann shows a sheet profile where the grooves on a first surface are positioned between two adjacent grooves of second surface and features first and second pressed surfaces (front and back of the formed compressed sheet) and contains first and second lumped portions partially overlapping each other as shown in Fig. 4.

With respect to the amendment to claim 1 adding that the compacted material is crushed to have "irregular shapes", Hoffman discloses (Fig. 1) crushing the compacted material to form irregular shapes.

Regarding claim 2, Fayed teaches that to obtain positive feed pressure and provide a more versatile means of control, screw feeders should be used (p. 346, col. 2, para 2) such as those with inclined screw feeders as shown in Figure 6.183(b) on p. 347, col. 1. Such screw feeders produce precompaction pressure that may be optimized (p. 355, col. 1, para 2).

Regarding claim 3 and 15, Hofmann's sheet was between 0.1" (2.54 mm) and 1" (25.4 mm) thick (col. 3, lines 22-26) and the density will be a function of the rolling speed, roll diameter, and a host of other factors as taught by Fayed.

With respect to the compacted sheet being continuous, Hofman's sheet that is being referred to is continuous compacted material.

Regarding claims 4 and 16-18 Joo teaches that the iron agglomerates are between 8 and 35 mm and that the coal in the coal packed bed is between 8 and 50

mm. MPEP 2144.05, para I states: “In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists.”

With respect to the crushed compacted material having a grain size of 50 mm or less (30 mm or less for claim 17), Hofmann crushed his agglomerates and Joo taught the preferred size range for later use.

Regarding claim 6, Hofmann teaches that any compacts that are not first crushed are recycled to be crushed again to reduce them to the proper size (col. 5, lines 1-10).

Regarding claim 7, Hofmann teaches that when processing such hot reactive materials, an inert atmosphere, such as nitrogen, is needed (col. 2, lines 29-34).

Regarding claim 11, Joo teaches mixing hot calcined additives such as calcined lime from multiple fluidized beds with fine direct reduced iron (col. 2, lines 17-34).

Regarding claim 12, Joo teaches that about 360 Kg of lime stone is required to produce one ton of molten iron and Joo thus teaches the amount of lime and the resultant quick lime (CaO) as a result effective variable in the production of heat and CO_2 gas that is discharged to the fluidized beds and one of ordinary skill would select the claimed range of additive content through routine experimentation.

Regarding claim 13, Hofmann teaches that his briquetting process is conducted between 1000 and 2000 °F (538 – 1093 °C) and MPEP 2144.05, para I states: “In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists.”

Regarding claim 14, Hofmann teaches that his roll press uses a pressure of between 20 and 350 tons and the Examiner holds that this range, when converted to bar, overlaps the claimed range.

5. **Claim 8** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Joo** in view of **Hofmann** and **Fayed** as applied to claims 1-4, 6-7, and 9-18 above, in further view of **McClelland** (US 6,352,573).

The disclosures of Joo, Hofmann, and Fayed were discussed above, however none of these references taught additional steps of wet scrubbing dust particles collected in each step and discharging the dried dust particles to the outside.

McClelland

McClelland, drawn to an improved method for separating and recycling hot fines produced in the hot briquetting of reduced iron (col. 1, lines 12-15), teaches that fines are especially produced during the breaking or crushing operation after roll pressing reduced iron (col. 1, lines 26-37). The fines should be removed and recycled in an economically feasible way (col. 1, lines 35-36) even though they are somewhat dangerous due to their pyrophoric nature (col. 1, lines 50-53).

Fines are removed after briquetting by pulling gas from the briquetting machine fines separator **16** to a wet scrubber **18** where it is compressed and reintroduced into the briquetting machine housing through inlet nozzle **36** (col. 4, lines 1-22 and claim 1).

It would have been obvious to one of ordinary skill in metallurgy, at the time the invention was made, to incorporate the wet scrubbing process of McClelland into the process of Joo, Hofmann, and Fayed, as McClelland teaches that his recycling process

has only one moving part, the blower, favorably recycles inert gases back to the briquetting machine, and allows for selective classification of fine particles to be removed (col. 4, lines 60-67).

6. **Claims 1, 3, 4, 6, 9-13, and 15-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Joo** (US 6,277,324) in view of **Hirsch** (DE 10156735—Using AU 2002-301887 B9 as an English Translation thereof).

Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

The disclosure of Joo was discussed above.

Hirsch

Hirsch, drawn to a method for hot compacting metal-containing particles such as sponge iron, discloses (p. 3, lines 5-12) feeding hot iron particles to a roller press at a temperature between 450°C to 950°C, producing a continuous strip plate by the roller press, and then crushing the strip to form granulate.

In contrast to briquetting in which the mold pockets are to impinge on each other substantially in an accurate fitting way, a variant for improved feed behavior and for producing desired predetermined breaking points provides for profiles disposed on both main sides having an identical shape and pitch, but an axial and radial offset relative to one another, thus resulting in a more uniform compaction (p. 7, lines 10-16).

Regarding claims 1, 9 and 10 it would have been obvious to one of ordinary skill in metallurgy, at the time the invention was made, to incorporate the hot iron roller

pressing and crushing method of Hirsch into the molten iron process of Joo as the compacted material shape of Hirsch is designed for more uniform compaction (p. 7, lines 10-16) and with ease of later crushing in mind and the crushed material (compacted sponge iron) is designed to be introduced into a melt and sink during further processing (p. 5, lines 20-26) and Joo taught that such reduced iron and calcined additive are charged into a melter-gasifier **31** to be manufactured into a molten iron (col. 10, lines 27-38).

With respect to the briquette shape of claims 1, 9, and 10 and the last amendments to claims 1 and 9, Fig. 8a discloses forming a compacted material where the webs 15 between two pockets 13 coincide again with the center of the pockets 13' of the press rollers 3 in the roller nip 4. The plate strip 7 is thereby provided with a wave shape when viewed in cross section (p. 11, lines 10-20). The compacted material plainly reads on the amended subject matter regarding the shape and profile of the compacted iron plate in terms of the pressed lumps on opposing sides and the partial overlap.

With respect to the amendment to claim 1 adding that the compacted material is crushed to have "irregular shapes", Hirsch disclosed that the strip plate can be crushed into granulate by shattering the strip plate into an irregular granular size (p. 7, para 17-32).

Regarding claims 3 and 15, The strip is crushed to produce a granulate of different granular sizes with densities of less than 5 g/cm^3 (4.92 tons (long)/m^3), see p. 7, lines 10-13. The density should preferably be in the range of 3 g/cm^3 to 5 g/cm^3 (2.95

– 4.92 ton/m^3, see p. 6, lines 15-22). Furthermore, Hirsch taught that the roller nip (thickness of the resultant plate) is between 5-40 mm, preferably 10 to 30 mm (p. 6, lines 23-30). The claims ranges of compacted material thickness and density overlap the ranges disclosed by Hirsch, thus establishing a prima facie case of obviousness per MPEP 2144.05.

Regarding claims 4 and 16-18, Joo teaches that the iron agglomerates are between 8 and 35 mm and that the coal in the coal packed bed is between 8 and 50 mm. MPEP 2144.05, para I states: “In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists.”

With respect to the crushed compacted material having a grain size of 50 mm or less (30 mm or less for claim 17), Hirsch crushed his agglomerates (compacted material) to a preferred final grain size and Joo taught the preferred size range for later use.

Regarding claim 6, Fig. 7 discloses a second crushing process for crushing already crushed compacted material to a final granulate size 12 (p. 13, lines 11-22). Pre-granulate 12’ is supplied to a screen means 35, and granulate below a specific size is directly discharged as the final product while pre-product over a specific screen size is fed to a secondary crusher (p. 14, lines 10-20). The grain size limitation is obvious in view of the final grain size taught by Joo of 8 – 35 mm.

Regarding claim 11, Joo teaches mixing hot calcined additives such as calcined lime from multiple fluidized beds with fine direct reduced iron (col. 2, lines 17-34).

Regarding claim 12, Joo teaches that about 360 Kg of lime stone is required to produce one ton of molten iron and Joo thus teaches the amount of lime and the resultant quick lime (CaO) as a result effective variable in the production of heat and CO_2 gas that is discharged to the fluidized beds and one of ordinary skill would select the claimed range of additive content through routine experimentation.

Regarding claim 13, Hirsch discloses feeding hot iron particles to a roller press at a temperature between 450°C to 950°C (p. 3, lines 5-12), which overlaps the claimed range of 400°C to 800°C, see MPEP 2144.05.

7. **Claim 2** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Joo** in view of **Hirsch** as applied to claims 1, 3, 4, 6, 9-13, and 15-18 above, in further view of **Fayed** (Rolling Pressing, in *Handbook of Powder Science and Technology*, 2nd Ed., edited by M.E. Fayed and L. Otten, 1997, ch. 6, p. 345-363.)

Neither Joo nor Hirsch discloses charging the reducing material in two slanted directions at acute angles to a direction perpendicular to the roller presses.

The disclosure of Fayed was discussed above.

It would have been obvious to one of ordinary skill in metallurgy, at the time the invention was made, to incorporate dual screw feeders arranged at acute angles to the roller presses as Hirsch taught that hot particles may be supplied to the roller press by a feed screw system to achieve pre-compaction of the particle or an increase in the throughput by generating a pre-pressure (p. 8, lines1-6) and Fayed provides an exemplary example of such a system.

Fayed also teaches that to obtain positive feed pressure and provide a more versatile means of control, screw feeders should be used (p. 346, col. 2, para 2) such as those with inclined screw feeders as shown in Figure 6.183(b) on p. 347, col. 1. Such screw feeders produce precompaction pressure that may be optimized (p. 355, col. 1, para 2).

8. **Claim 8** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Joo** in view of **Hirsch** as applied to claims 1, 3, 4, 6, 9-13, and 15-18 above, in further view of **McClelland** (US 6,352,573).

The disclosures of Joo and Hirsch were discussed above, however none of these references taught additional steps of wet scrubbing dust particles collected in each step and discharging the dried dust particles to the outside.

The disclosure of McClelland was discussed above.

Claim 8 is rejected over the combination of references in view of McClelland for the same reasons as stated in section 4 above.

9. **Claims 7 and 14** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Joo** in view of **Hirsch** as applied to claims 1, 3, 4, 6, 9-13, and 15-18 above, in further view of **Hoffman** (US 3,897,183 A1).

All three of these references were discussed above, however Joo and Hirsch did not teach supplying nitrogen gas nor the roll pressure during roll pressing.

Regarding claim 7, it would have been obvious to one of ordinary skill in metallurgy, at the time of the invention, to supply nitrogen during the process of Joo and Hirsch as Hofmann teaches that when processing such hot reactive materials, an inert atmosphere, such as nitrogen, is needed (col. 2, lines 29-34).

Regarding claim 14 , it would have been obvious to one of ordinary skill in metallurgy, at the time of the invention, to press fine direct molten iron at the claimed pressure as Joo and Hirsch are silent as to this parameter while Hofmann teaches that his roll press uses a pressure of between 20 and 350 tons (the Examiner holds that this range, when converted to bar, overlaps the claimed range) and one would be motivated to look to Hofmann for this parameter as Hofmann is very similar to Hirsch in teaching the roller pressing of molten iron for later crushing.

Response to Applicant's Arguments:

10. Applicant's arguments filed June 29th, 2009 have been fully considered but they are not persuasive.

Applicants assert (p. 10, para 4 to p. 11, para 1) that the lumps of Hoffman are discontinuous across a surface of the material, where the lumps on one side are separated by flat portions, therefore, the lumps of Hoffman are not continuous, as recited by the amended claims.

In response, the claims only require that the lumped portions be "adjacent to each other" and have lumped portions be continuously formed on the pressed surfaces,

not that the lumps directly abut so as to exclude the flat portions as shown by Hoffman's compacted sheet.

Conclusion

-- Claims 1-4 and 6-18 are rejected
-- No claims are allowed

The rejections above rely on the references for all the teachings expressed in the texts of the references and/or one of ordinary skill in the metallurgical art would have reasonably understood or implied from the texts of the references. To emphasize certain aspects of the prior art, only specific portions of the texts have been pointed out. Each reference as a whole should be reviewed in responding to the rejection, since other sections of the same reference and/or various combinations of the cited references may be relied on in future rejections in view of amendments.

All recited limitations in the instant claims have been met by the rejections as set forth above. Applicant is reminded that when amendment and/or revision is required, applicant should therefore specifically point out the support for any amendments made to the disclosure. See 37 C.F.R. § 1.121; 37 C.F.R. Part §41.37 (c)(1)(v); MPEP §714.02; and MPEP §2411.01(B).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark L. Shevin whose telephone number is (571) 270-3588 and fax number is (571) 270-4588. The examiner can normally be reached on Monday - Friday, 8:30 AM - 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy M. King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

/Mark L. Shevin/
Examiner, Art Unit 1793

July 7th, 2009
10-539,743

/George Wyszomierski/
Primary Examiner
Art Unit 1793